Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests

The Montréal Process

December 1999
Second Edition

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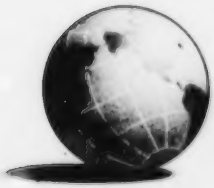

Preface

The Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests (Montréal Process) was formed in June 1994 to advance the development of internationally agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests at the national level. Original members of the Working Group included 10 countries – Australia, Canada, Chile, China, Japan, the Republic of Korea, Mexico, New Zealand, the Russian Federation and the United States of America – which together represent 90 percent of the world's temperate and boreal forests. Several international organizations, non-governmental organizations and other countries also participated in meetings of the Working Group.

In February 1995 in Santiago, Chile, the original 10 Montréal Process member countries issued the Santiago Declaration containing a comprehensive set of criteria and indicators for use by policy-makers, forest managers, and the general public.

The Governments of Uruguay and Argentina endorsed the Santiago Declaration in July and October 1995 respectively, bringing membership in the Montréal Process to 12 countries.

Further information about the Montréal Process can be found at the Montréal Process Web Site at **http://www.mpci.org** and in the following documents, available from the Montréal Process Liaison Office, Canadian Forest Service, Natural Resources Canada, Ottawa, Canada:

Forests for the Future — Montréal Process Criteria and Indicators, December 1999

Montréal Process Criteria and Indicators — Technical Notes, December 1999

First Approximation Report of the Montréal Process, August 1997

The Montréal Process Progress Report, February 1997

Charleston, SC, USA
December 1, 1999

NOTE: In this edition of the Santiago Declaration, the numbering system used for the 67 indicators has been modified for clarity and ease of reference.

Although the state of data collection techniques in relation to the Montréal Process criteria and indicators may have advanced, footnote 1 on page 6 is retained in this revised version of the Santiago Declaration, in the interests of retaining the original intent of the document.

Santiago Declaration Statement on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests

The Governments of Australia, Canada, Chile, China, Japan, Mexico, New Zealand, the Republic of Korea, the Russian Federation and the United States of America, which are participating in the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests (Montréal Process) and whose countries contain a significant portion of the world's temperate and boreal forests:

Recognizing that the sustainable management of all types of forests, including temperate and boreal forests, is an important step to implementing the Statement of Forest Principles and Agenda 21, adopted by the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in June 1992, and is relevant to the United Nations conventions on biological diversity, climate change and desertification;

Also recognizing the value of having an internationally accepted understanding of what constitutes sustainable management of temperate and boreal forests, and the value of agreed criteria and indicators for sustainable forest management in advancing such an understanding,

Mindful that the application of agreed criteria and indicators will need to take account of the wide differences among States regarding the characteristics of their forests, including planted and other forests, land ownership, population, economic development, scientific and technological capacity, and social and political structure,

Taking note of other international initiatives regarding the development of criteria and indicators for sustainable forest management,

Affirming their commitment to the conservation and sustainable management of their respective forests; and

Having undertaken substantive discussions to develop agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests,

Endorse the non-legally binding Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests annexed to this Statement as guidelines for use by their respective policy-makers;

Encourage other States which have temperate and boreal forests to consider the endorsement and use of these criteria and indicators;

Note the ongoing nature of the discussion on these criteria and indicators and the need to update the annex as new technical and scientific information and data become available and assessment capability increases; and

Request the Government of Chile, on behalf of the above States, to present this Statement, together with its annex, to the FAO Meeting of Ministers Responsible for Forestry, to be held in Rome, March 16–17, 1995, and the third session of the United Nations Commission on Sustainable Development, to be held in New York, April 11–28, 1995.

Santiago, Chile
February 3, 1995

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Section 1

Introduction

1.0 Forests are essential to the long-term well being of local populations, national economies, and the earth's biosphere as a whole. In adopting the statement of Forest Principles and Chapter 11 of *Agenda 21*, the 1992 UN Conference on Environment and Development (UNCED) recognized the importance of sustainably managing all types of forests in order to meet the needs of present and future generations.

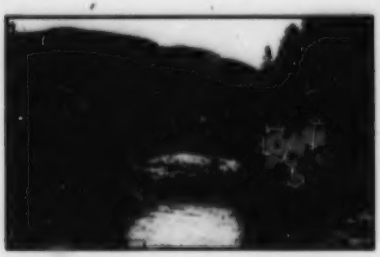
1.1 The development of criteria and indicators for the conservation and sustainable management of temperate and boreal forests is an important step in implementing the UNCED Forest Principles and *Agenda 21*, and is relevant to the UN conventions on biodiversity, climate change and desertification. It is also an important step to furthering the joint commitment made by tropical timber consumer countries in January 1994 to maintain, or achieve by the year 2000, the sustainable management of their respective forests.

1.2 The criteria and indicators listed under Sections 3 and 4 apply broadly to temperate and boreal forests. They are intended to provide a common understanding of what is meant by sustainable forest management. They also provide a common framework for describing, assessing and evaluating a country's progress toward sustainability at the national level. They are not intended to assess directly sustainability at the forest management unit level. As such, the criteria and indicators should help provide an international reference for policy-makers in the formulation of national policies and a basis for international cooperation aimed at supporting sustainable forest management. Internationally agreed criteria and indicators could also help clarify ongoing dialogues related to international trade in products from sustainably managed forests.

1.3 The approach to forest management reflected in the criteria and indicators is the management of forests as ecosystems. Taken together, the set of criteria and indicators suggests an implicit definition of the conservation and sustainable management of forest ecosystems at the country level. It is recognized that no single criterion or indicator is alone an indication of sustainability. Rather, individual criteria and indicators should be considered in the context of other criteria and indicators.

1.4 It should be emphasized that an informed, aware and participatory public is indispensable to promoting the sustainable management of forests. In addition to providing a common understanding of what is meant by sustainable forest management in the temperate and boreal region, the criteria and indicators should be useful in improving the quality of information available not only to decision-makers but also to the general public. This in turn should better inform the policy debate at national and international levels.

1.5 Each country is unique in terms of the quantity, quality, characteristics and descriptions of its forests. Countries also differ in terms of forest conditions relative to national population, such as the amount of forest per capita, the amount reforested annually per capita or the annual forest growth per capita. National circumstances further differ with respect to stages of economic development, land ownership patterns, population patterns, forms of social and political organization, and expectations of how forests should contribute or relate to society.



1.6 Given the wide differences in natural and social conditions among countries, the specific application and monitoring of the criteria and indicators, as well as the capacity to apply them, will vary from country to country based on national circumstances. It is anticipated that individual countries would develop specific measurement schemes appropriate to national conditions to address how data would be gathered. Qualitative terms such as "significant" or "low", which are used as indicator descriptors in some cases, would also be defined based on national conditions. Despite these differences, efforts should be made to harmonize the approaches of countries to measuring and reporting on indicators.

1.7 Changes in the status of forests and related conditions over time, and the direction of the change, are relevant to assessing sustainability. Therefore, indicators should be understood to have a temporal dimension. This means they will need to be assessed as trends (e.g., at points in time) or with an historical perspective to establish trends. The monitoring of changes in indicators will be essential to evaluating whether and how progress is being made toward the sustainability of forest management at the national level.

1.8 While it may be desirable to have quantitative indicators that are readily measured or for which measurements already exist, such indicators alone will not be sufficient to indicate the sustainability of forest management. Some important indicators may involve the gathering of new or additional data, a new program of systematic sampling or even basic research. Furthermore, some indicators of a given criterion may not be quantifiable. In cases where there are no reasonable quantitative measures for indicators, qualitative or descriptive indicators are important. These may require subjective judgments as to what constitutes effective, adequate or appropriate national conditions, or trends in conditions, with respect to the indicator.

1.9 Concepts of forest management evolve over time based on scientific knowledge of how forest ecosystems function and respond to human interventions, as well as in response to changing public demands for forest products and services. The criteria and indicators will need to be reviewed and refined on an on-going basis to reflect new research, advances in technology, increased capability to measure indicators, and an improved understanding of what constitutes appropriate indicators of sustainable forest management.

Section 2

Definitions

2.0 Criterion:

A category of conditions or processes by which sustainable forest management may be assessed.

A criterion is characterized by a set of related indicators that are monitored periodically to assess change.

2.1 Indicator:

A measure (measurement) of an aspect of the criterion.

A quantitative or qualitative variable that can be measured or described and that when observed periodically demonstrates trends.

2.2 Monitoring:

The periodic and systematic measurement and assessment of change of an indicator.

2.3 Forest type:

A category of forest defined by its vegetation, particularly composition, and/or locality factors, as categorized by each country in a system suitable to its situation.

2.4 Ecosystem:

A dynamic complex of plant, animal, fungal and microorganism communities and the associated non-living environment with which they interact.

Section 3

Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests Criteria 1–6

3.0 The following six criteria and associated indicators characterize the conservation and sustainable management of temperate and boreal forests. They relate specifically to forest conditions, attributes or functions, and to the values or benefits associated with the environmental and socio-economic goods and services that forests provide. The intent or meaning of each criterion is made clear by its respective indicators. No priority or order is implied in the alphanumeric listing of the criteria and indicators.

Criterion 1

Conservation of Biological Diversity

Biological diversity includes the elements of the diversity of ecosystems, the diversity between species, and genetic diversity in species.

Indicators:

1.1 Ecosystem diversity

1.1.a Extent of area by forest type relative to total forest area-(a)[1];

1.1.b Extent of area by forest type and by age class or successional stage-(b);

[1] Indicators followed by an 'a' are those for which most data are available. Indicators followed by a 'b' are those which may require the gathering of new or additional data and/or a new program of systematic sampling or basic research.

1.1.c Extent of area by forest type in protected area categories as defined by IUCN[2] or other classification systems-(a);

1.1.d Extent of areas by forest type in protected areas defined by age class or successional stage-(b);

1.1.e Fragmentation of forest types-(b).

1.2 Species diversity

1.2.a The number of forest dependent species-(b);

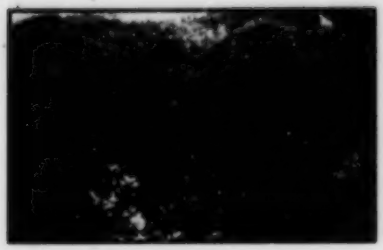
1.2.b The status (threatened, rare, vulnerable, endangered, or extinct) of forest dependent species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment-(a).

1.3 Genetic diversity

1.3.a Number of forest dependent species that occupy a small portion of their former range-(b);

1.3.b Population levels of representative species from diverse habitats monitored across their range-(b).

[2] IUCN categories include: I. Strict protection, II. Ecosystem conservation and tourism, III. Conservation of natural features, IV. Conservation through active management, V. Landscape/Seascape conservation and recreation, VI. Sustainable use of natural ecosystems.



Criterion 2

Maintenance of Productive Capacity of Forest Ecosystems

Indicators:

- 2.a Area of forest land and net area of forest land available for timber production-(a);
- 2.b Total growing stock of both merchantable and non-merchantable tree species on forest land available for timber production-(a);
- 2.c The area and growing stock of plantations of native and exotic species-(a);
- 2.d Annual removal of wood products compared to the volume determined to be sustainable-(a);
- 2.e Annual removal of non-timber forest products (e.g., fur bearers, berries, mushrooms, game), compared to the level determined to be sustainable-(b).

Criterion 3

Maintenance of Forest Ecosystem Health and Vitality

Indicators:

3.a Area and percent of forest affected by processes or agents beyond the range of historic variation, e.g., by insects, disease, competition from exotic species, fire, storm, land clearance, permanent flooding, salinisation, and domestic animals-(b);

3.b Area and percent of forest land subjected to levels of specific air pollutants (e.g., sulfates, nitrate, ozone) or ultraviolet B that may cause negative impacts on the forest ecosystem-(b);

3.c Area and percent of forest land with diminished biological components indicative of changes in fundamental ecological processes (e.g., soil nutrient cycling, seed dispersion, pollination) and/or ecological continuity (monitoring of functionally important species such as fungi, arboreal epiphytes, nematodes, beetles, wasps, etc.)-(b).

Criterion 4

Conservation and Maintenance of Soil and Water Resources

This criterion encompasses the conservation of soil and water resources and the protective and productive functions of forests.

Indicators:

- 4.a Area and percent of forest land with significant soil erosion-(b);
- 4.b Area and percent of forest land managed primarily for protective functions, e.g., watersheds, flood protection, avalanche protection, riparian zones-(a);
- 4.c Percent of stream kilometres in forested catchments in which stream flow and timing has significantly deviated from the historic range of variation-(b);
- 4.d Area and percent of forest land with significantly diminished soil organic matter and/or changes in other soil chemical properties-(b);
- 4.e Area and percent of forest land with significant compaction or change in soil physical properties resulting from human activities-(b);
- 4.f Percent of water bodies in forest areas (e.g., stream kilometres, lake hectares) with significant variance of biological diversity from the historic range of variability-(b);

4.g Percent of water bodies in forest areas (e.g., stream kilometres, lake hectares) with significant variation from the historic range of variability in pH, dissolved oxygen, levels of chemicals (electrical conductivity), sedimentation or temperature change-(b);

4.h Area and percent of forest land experiencing an accumulation of persistent toxic substances-(b).

Criterion 5

Maintenance of Forest Contribution to Global Carbon Cycles

Indicators:

5.a Total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class, and successional stages-(b);

5.b Contribution of forest ecosystems to the total global carbon budget, including absorption and release of carbon (standing biomass, coarse woody debris, peat and soil carbon)-(a or b);

5.c Contribution of forest products to the global carbon budget-(b).

Criterion 6

Maintenance and Enhancement of Long-Term Multiple Socio-Economic Benefits to Meet the Needs of Societies

Indicators:

6.1 Production and consumption

6.1.a Value and volume of wood and wood products production, including value added through downstream processing-(a);

6.1.b Value and quantities of production of non-wood forest products-(b);

6.1.c Supply and consumption of wood and wood products, including consumption per capita-(a);

6.1.d Value of wood and non-wood products production as percentage of GDP-(a or b);

6.1.e Degree of recycling of forest products-(a or b);

6.1.f Supply and consumption/use of non-wood products-(a or b).

6.2 Recreation and tourism

6.2.a Area and percent of forest land managed for general recreation and tourism, in relation to the total area of forest land-(a or b);

6.2.b Number and type of facilities available for general recreation and tourism, in relation to population and forest area-(a or b);

6.2.c Number of visitor days attributed to recreation and tourism, in relation to population and forest area-(b).

6.3 Investment in the forest sector

6.3.a Value of investment, including investment in forest growing, forest health and management, planted forests, wood processing, recreation and tourism-(a);

6.3.b Level of expenditure on research and development, and education-(b);

6.3.c Extension and use of new and improved technologies-(b);

6.3.d Rates of return on investment-(b).

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6.4 Cultural, social and spiritual needs and values

6.4.a Area and percent of forest land managed in relation to the total area of forest land to protect the range of cultural, social and spiritual needs and values-(a or b);

6.4.b Non-consumptive use forest values-(b).

6.5 Employment and community needs

6.5.a Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment-(a or b);

6.5.b Average wage rates and injury rates in major employment categories within the forest sector-(a);

6.5.c Viability and adaptability to changing economic conditions, of forest dependent communities, including indigenous communities-(b);

6.5.d Area and percent of forest land used for subsistence purposes-(b).

Section 4

Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests Criterion 7

4.0 Criterion 7 and associated indicators relate to the overall policy framework of a country that can facilitate the conservation and sustainable management of forests. Included are the broader societal conditions and processes often external to the forest itself but which may support efforts to conserve, maintain or enhance one or more of the conditions, attributes, functions and benefits captured in criteria 1 – 6. No priority or order is implied in the listing of the indicators.

Criterion 7

Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

Indicators:

7.1 Extent to which the *legal framework* (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it:

7.1.a Clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of indigenous people, and provides means of resolving property disputes by due process;

7.1.b Provides for periodic forest-related planning, assessment, and policy review that recognizes the range of forest values, including coordination with relevant sectors;

7.1.c Provides opportunities for public participation in public policy and decision-making related to forests and public access to information;

7.1.d Encourages best practice codes for forest management;

7.1.e Provides for the management of forests to conserve special environmental, cultural, social and/or scientific values.

7.2 Extent to which the *institutional framework* supports the conservation and sustainable management of forests, including the capacity to:

7.2.a Provide for public involvement activities and public education, awareness and extension programs, and make available forest-related information;

7.2.b Undertake and implement periodic forest-related planning, assessment, and policy review including cross-sectoral planning and coordination;

7.2.c Develop and maintain human resource skills across relevant disciplines;

7.2.d Develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and support forest management;

7.2.e Enforce laws, regulations and guidelines.

7.3 Extent to which the *economic framework* (economic policies and measures) supports the conservation and sustainable management of forests through:

7.3.a Investment and taxation policies and a regulatory environment which recognize the long-term nature of investments and permit the flow of capital in and out of the forest sector in response to market signals, non-market economic valuations, and public policy decisions in order to meet long-term demands for forest products and services;

7.3.b Non-discriminatory trade policies for forest products.

7.4 Capacity to *measure and monitor* changes in the conservation and sustainable management of forests, including:

7.4.a Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with criteria 1–7;

7.4.b Scope, frequency and statistical reliability of forest inventories, assessments, monitoring and other relevant information;

7.4.c Compatibility with other countries in measuring, monitoring and reporting on indicators.

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7.5 Capacity to conduct and apply *research and development* aimed at improving forest management and delivery of forest goods and services, including:

7.5.a Development of scientific understanding of forest ecosystem characteristics and functions;

7.5.b Development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies, and to reflect forest-related resource depletion or replenishment in national accounting systems;

7.5.c New technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies;

7.5.d Enhancement of ability to predict impacts of human intervention on forests;

7.5.e Ability to predict impacts on forests of possible climate change.

Contacts:

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